

MEDICAL CONTROL GUIDELINE: NEEDLE THORACOSTOMY

PRINCIPLES:

1. Needle thoracostomy is an uncommon procedure that may provide life-saving treatment of a tension pneumothorax during prehospital care and transport.
2. Risk of tension pneumothorax increases significantly after initiation of positive pressure ventilation (e.g., bag-mask ventilation, placement of advanced airway), which can convert a simple pneumothorax into a tension pneumothorax.
3. Needle thoracostomy should be performed prior to base contact on patients in PEA cardiac arrest with multisystem blunt trauma or penetrating trauma which includes the thorax and abdomen or who have evidence of chest trauma with profound shock and signs of tension pneumothorax, as defined in Guidelines 2.1 below.
4. PEA cardiac arrest maybe due to tension pneumothorax after positive pressure ventilation.
5. Current guidelines recommend needle thoracostomy at the 2nd intercostal space in the mid-clavicular line, inserted just above the upper border of the 3rd rib. An alternate site is the 4th or 5th intercostal space at the anterior axillary line.
6. ALS and Paramedic Assessment Units should carry 8cm (3.0 – 3.5 inches) 14G commercial needle decompression for the performance of emergency needle thoracostomy.
7. The procedure for needle thoracostomy in pediatric patient is unchanged from that of adults. It is expected that a shorter distance will need to be traversed to enter the pleural space in children due to the thinner chest wall.
8. Maintenance of skills requires regular in-service training on recognition and treatment of tension pneumothorax. It is strongly recommended that this training be completed in a simulation environment, rather than through slide-based or didactic learning.

GUIDELINES:

1. Assess patient with traumatic injuries as per Reference No. 1275 or 1277.
2. Consider tension pneumothorax in the following patients.
 - 2.1. Trauma patients with obvious chest trauma (e.g., open chest wounds, evidence of crush or flail segment) or with mechanism consistent with chest trauma who demonstrate:
 - a. Decreased or absent breath sounds on affected side , **and**
 - b. SBP less than 90mmHg (adult), less than 70mmHg (child and infant), **and**
 - c. One or more of the following:

- i. Altered mental status
 - ii. Severe respiratory distress, with RR greater than 30 breaths per minute or less than 10 breaths per minute
 - iii. Severe hypoxia, with less than 90% oxygen saturation
 - iv. Cool, pale, moist skin
- 2.2. Traumatic full arrest with PEA rhythm (bilateral needle thoracostomy should be performed if evidence of chest wall trauma)
- 2.3. Trauma patients requiring positive-pressure ventilation who develop hypoxia or severe hypotension (SBP less than 90mmHg), without alternate cause, after initiation of positive pressure ventilation
- 2.4. PEA cardiac arrest patient after positive pressure ventilation
3. Immediately place all patients with suspected pneumothorax on high flow oxygen by non-rebreather mask.
4. If the patient is awake and alert, explain medical condition and rationale for the procedure to the patient.
5. Palpate the chest wall for the 2nd and 3rd rib approximately 2 finger breaths below the clavicle, at the mid-clavicular line. If the entire extent of the clavicle is not easily assessed, the midclavicular line may be approximated as just medial to the midpoint between the sternal notch and the shoulder.
6. If unable to identify landmarks in the anterior chest, or if obstructed due to presence of wounds, body armor, or other obstruction, palpate the lateral chest wall for the 4th and 5th rib at the anterior axillary line.
7. Prepare skin of chest with alcohol or chlorhexidine prior to skin puncture.
8. Insert the needle-catheter perpendicular to chest just above the 3rd rib at the mid-clavicular line or just above the 5th rib anterior axillary line.
9. Attach a syringe to the thoracostomy needle during procedure, if possible. Advance needle perpendicular to the chest wall while withdrawing on syringe until air is easily aspirated into the syringe (confirming penetration of lung pleura). Advance needle an additional 1 centimeter, then over the needle advance catheter further before withdrawing needle and disconnecting the syringe.
10. Secure catheter to skin with tape or commercial device, if available. Do not place a 1-way valve on the catheter hub.
11. If the patient has an open or sucking chest wound, cover the wound with a commercially available vented chest seal or vented (3-sided) occlusive dressing. Placement of a vented dressing can prevent conversion of an open pneumothorax to a tension pneumothorax. However, tension pneumothorax may still develop in the presence of a vented dressing and should be treated with needle thoracostomy. Furthermore, needle thoracostomy in a patient with evidence of tension pneumothorax should not be delayed for placement of dressing.
12. If a patient does not improve after needle thoracostomy, or improves but later decompensates, and there is concern for catheter dislodgement or obstruction, needle thoracostomy may be repeated on the same side or at an alternate location.